

Western Burrowing Owl

(*Athene cunicularia hypugea*)

Status

Federal: Species of Concern

State: Species of Special Concern

Other: Federal Migratory Bird Treaty Act

Recovery Plan: None

Placer Legacy Category: 3



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Distribution

North America

Burrowing owl lives and breeds in the desert and grassland habitats from south central Canada through most of the Central United States and Central America to the southern end of South America (Rosenberg et al. 1998).

California

In California the range of western burrowing owl extends through the lowlands south and west from north central California to Mexico, with small, scattered populations occurring in the Great Basin and the desert regions of the southwestern part of the state (DeSante et al. 1996). Western burrowing owl is absent from the coast north of Sonoma County and from high mountain areas such as the Sierra Nevada and the ranges extending east from Santa Barbara to San Bernardino. Western burrowing owl populations have been greatly reduced or extirpated from the San Francisco Bay area (Trulio 1997) along the coast to Los Angeles. They have also apparently disappeared from the Coachella Valley. The remaining major population densities of western burrowing owl in California are in the Central and Imperial valleys (DeSante et al. 1996).

Placer County Plan Area

Historical

There is no information on historic population size and distribution of western burrowing owl that is specific to the Plan area. Grinnell and Miller (1944) indicated that the species was “originally common” and even “abundant” in suitable habitat that includes the Plan area.

Current

Western burrowing owl is considered rare in Placer County (Webb 2009) and no longer breeds in the county (Pandolfino pers. comm.). There are four recent records of western burrowing owl in Placer County in the California Natural Diversity Database (May 2010), likely of over-wintering birds: 1) two individuals in moderately grazed, rolling grassland on the north side of Philip Road, approximately 0.75 mile west of Fiddymont Road, northwest of Roseville. These individuals

were observed year-round in 1998, but none were observed on May 5, 2003; 2) one adult was observed at a burrow site on January 30, February 1, and February 18, 2008 on the Moore Ranch Wetland Restoration Project property 250 feet north of east Catlett Road, 0.4 mile west of Fiddymont Road, southwest of Lincoln. The habitat consisted of mixed native and non-native grassland within a vernal pool restoration project area, surrounded by grazed and ungrazed pastures; 3) two adults were observed April 29, 2008 at a burrow site in open grassland on the Swainson's Preserve, 0.43 mile south, southeast of the intersection of West Wise Road and Highway 65; and 4) at least one individual at the Sterling Silver Stables in the southwest corner of the Plan area in 2007. In addition to the California Natural Diversity Database records, a single western burrowing owl has been observed on the annual Lincoln Christmas Bird Count every year since the 2002 count, except in 2006 and 2008 when none were observed. Western burrowing owl was also observed at three locations in the Plan area during the 2003 Watershed surveys for the Placer Legacy program (Pandolfino pers. comm., Easterla pers. comm.).

Population Status & Trends

North America

Burrowing owl was once widespread and generally common over western North America. In recent decades a number of populations have declined or, in some cases, disappeared altogether. Burrowing owl is now endangered in Canada and has declined in many parts of the United States (DeSante et al 1996, 1997; James and Espie 1997; Sauer et al. 2005). In California the species is a species of special concern; it is listed as endangered or threatened in a number of other states.

California

The California Department of Fish and Game indicates that the California population of western burrowing owl is between 1,000 and 10,000 pairs (James and Espie 1997; Rosenberg et al. 1998) with a declining trend. Christmas Bird Count data from 1959 – 1988 show declines in midwinter numbers of western burrowing owl in California (Sauer et al. 1996). In contrast, the numbers of western burrowing owl on Breeding Bird Survey Routes in California increased significantly from 1968 to 2004 (Sauer et al. 2005). The primary factors cited in the decline are habitat loss, pesticides, predators, harassment, reduced burrow availability, and vehicle collisions.

Placer County Plan Area

There is no detailed information on population trends of western burrowing owl in Placer County because of the lack of baseline data; however, Webb (2009) describes the population as declining.

Natural History

The habitat requirements, ecological relationships, life history, and threats to western burrowing owl described below are summarized in diagram form in the envirogram (Figure 1).

Habitat Requirements

Western burrowing owl is found in open, dry grasslands, agricultural and range lands, and desert habitats often associated with burrowing animals and short vegetation. It can also inhabit grass, forb, and shrub stages of piñon and ponderosa pine habitats. Western burrowing owl requires burrows for roosting and nesting. In California, nest and roost burrows are most commonly dug by ground squirrels (e.g., *Spermophilus beecheyi*), but the owl may also use the dens or holes of other species such as badger (*Taxidea taxus*) and coyote (*Canis latrans*). It

can be found at elevations ranging from 200 feet below sea level to 9,000 feet above sea level. Western burrowing owl commonly perches on fence posts or on mounds outside the burrow. It can be found at the margins of airports and golf courses and in vacant urban lots. It is active day and night, but is usually less active in the peak of the day (Rosenberg et al. 1998).

Reproduction

The breeding season for western burrowing owl is March to late August; the season tends to last later in the northern part of the range. Clutch size ranges from 1-12 eggs and averages about 7 eggs. The incubation period is 28–30 days. The female performs all of the incubation and brooding and is believed to remain continually in the burrow while the male does all the hunting. The young fledge at 44 days but remain near the burrow and join the adults in foraging flights at dusk (Rosenberg et al. 1998).

Dispersal Patterns

Western burrowing owl tends to be resident where food sources are stable and available year-round. It disperses or migrates south in areas where food becomes seasonally scarce. In resident populations, nest-site fidelity is common, with many adults renesting each year in their previous year's burrow; young from the previous year often establish nest sites near (<1000 feet) their natal sites (Rosenberg et al. 1998). Western burrowing owls in migratory populations also often renest in the same burrow, particularly if the previous year's breeding was successful (Belthoff and King 1997). Other birds in the same population may move to burrows near their previous year's burrow.

Longevity

The maximum life span recorded for a banded bird in the wild is about 8.5 years (Rosenberg et al. 1998).

Sources of Mortality

Predators of western burrowing owl includes prairie falcon (*Falco mexicanus*), red-tailed hawk (*Buteo jamaicensis*), Swainson's hawk (*Buteo swainsoni*), ferruginous hawk (*Buteo regalis*), northern harrier (*Circus cyaneus*), golden eagle (*Aquila chrysaetos*), foxes, coyote (*Canis latrans*), and domestic dogs and cats. Many owls are killed at night by traffic when flying low over roads. Attempts to exterminate rodents by the use of poisons may also kill western burrowing owls (Rosenberg et al. 1998).

Behavior

Western burrowing owl tends to be an opportunistic feeder. Large arthropods, mainly beetles and grasshoppers, comprise a substantial portion of its diet. Small mammals, especially mice, rats, gophers, and ground squirrels, are also important food items. Other prey animals include reptiles and amphibians, scorpions, young cottontail rabbits, bats, and birds such as sparrows and horned larks (*Eremophila alpestris*). Consumption of insects increases during the breeding season. Western burrowing owl hovers while hunting; after catching the prey it returns to perches on fence posts or the ground. Western burrowing owl is primarily active at dusk and dawn, but if necessary will hunt at any time of day (Rosenberg et al. 1998).

Movement and Migratory Patterns

Northern populations of western burrowing owl are usually migratory, while more southern populations may move short distances (Coulombe 1971; Martin 1973; Botelho 1996) or not at all (Brenckle 1936; Ligon 1961; Thomsen 1971; Haug et al. 1993). Little is known about the winter ranges of migratory populations (Haug et al. 1993), although migratory western burrowing owl is believed to mix with year-round resident populations in California during the winter months.

(Coulombe 1971). Moreover, those western burrowing owls breeding farthest north appear to migrate the farthest south (James and Ethier 1989).

Ecological Relationships

Western burrowing owl in California is commensal with California ground squirrel (*Spermophilus beecheyi*) in rangeland and agricultural areas. It may compete incidentally with other predators such as coyote, other owls and hawks, skunks, weasels, and badgers for rodents and a variety of insects (Rosenberg et al. 1998).

Population Threats

Conversion of grasslands to agriculture, other habitat destruction, and poisoning of ground squirrels have contributed to population reductions first noted in the 1940s. Declines have been greatest along the central and southern California coast, likely due to large-scale urbanization.

Context for a Regional Conservation Strategy

Western burrowing owl is present, but rare, in western Placer County. Populations in the Plan area are on the eastern edge of the species' central range in California. In the region, western burrowing owl is known primarily from the south and southeast of western Placer, although there are scattered records of occurrence in Yuba, Butte and Colusa counties. Although limited in occurrence in the Plan area, protection of individual occurrences is not critical. Western burrowing owl has been successfully relocated ("passive relocation") and has also been found to utilize man-made burrows (Trulio 1995). The preservation of habitat in general however, is stressed. Loss of habitat and poisoning of ground squirrels are the top causes of decline of the species statewide. Lands prioritized for preservation/acquisition include annual grasslands and rangelands. In addition, agricultural lands often provide suitable habitat and their protection may benefit the species. The presence of ground squirrel burrows on these lands is critical in providing breeding habitat, although the species may forage in grasslands, rangelands, and agricultural lands devoid of burrows.

Modeled Species Distribution in the Plan Area

Model Assumptions

Nesting Habitat (Primary Habitat)

No nesting habitat was modeled for the Plan area because there are no recent records of breeding in the Plan area.

Overwintering Habitat (Secondary Habitat)

Modeled overwintering habitat for western burrowing owl includes valley oak woodland, oak woodland savanna, vernal pool complex, annual grassland, alfalfa, irrigated pasture, pasture, rice, and row crop.

Rationale

Western burrowing owls apparently no longer breed within the Plan area, and recent occurrence records are for overwintering individuals. Suitable potential nesting habitat could not be discerned from the data; therefore, potential nesting habitat was not modeled for western burrowing owl. Modeled overwintering habitat likely encompasses some potential nesting habitat, however. Western burrowing owls use open, dry grasslands and agricultural and range lands that have burrowing animals and short vegetation. Western burrowing owls forage in open grasslands, pasturelands, agricultural fields and field edges, and along the edges of roads and levees where vegetation is low. Western burrowing owls require burrows for roosting and

nesting. Western burrowing owls nest in open habitats with sparse vegetative cover and a high density of burrows. The land-cover types that characterize nesting and foraging habitat for western burrowing owl capture the general habitat requirements of western burrowing owl. This model, however, overestimates the extent of western burrowing owl habitat because the specific characteristics of western burrowing owl habitat are likely patchily distributed within the Plan area.

Model Results

Figure 2 shows the modeled potential habitat for western burrowing owl within the Plan area. Potential overwintering habitat occurs throughout the Plan area, though it is primarily concentrated in the western portion of the Plan area. The known occurrences of this species fall within the modeled habitat.

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Envirogram Narrative

Western Burrowing Owl (*Athene cunicularia hypugea*)

The envirogram was created based on the information provided in this species account. The envirogram is a tool to help depict and organize the most important ecological factors that affect a population or group of populations of a particular species. The envirogram consists of Direct Components – components of the environment that directly affect a species' chances to survive and reproduce, and several webs comprised of distal factors (i.e., Indirect Components, Management Problems, and Mitigation Actions) that act in sequence to affect the Direct Components. The Direct Components consist of four major categories: resources, hazards, reproduction, and dispersal. Each of these is subdivided as necessary. For example, resources are subdivided into foraging habitat, nest sites, and prey.

The webs identify the underlying ecological processes or human actions that influence each Direct Component. Distal factors in the web activate proximate components. Each of these pathways in the web are constructed from right to left, with Indirect Components immediately to the left of Direct Components directly affecting the Direct Component, and secondary Indirect Components affecting primary Indirect Components. Management Problems can directly affect the Indirect Components, and Mitigation Actions provide solutions to remedy the Management Problems.

Resources

Res1: Western burrowing owls rely upon grasslands or agricultural fields for foraging habitat, and much of this has been lost to various kinds of development. Conservation of agricultural land and the creation of reserves can mitigate this loss to some degree.

Res2: The owls use burrows created by rodents, especially California ground squirrels (*Spermophilus beecheyi*), for nesting and roosting. Thus, the presence of medium-sized rodents is necessary for western burrowing owls. Excessive rodent control can eliminate these species, so land management that integrates agricultural production and conservation is necessary. Artificial nest sites also are used by the owls and can be used as a management technique to increase population sizes.

Res3: Prey of western burrowing owls includes large arthropods, small mammals, reptiles, amphibians, and small birds. During years with favorable weather, prey species are abundant in healthy grassland ecosystems and agricultural fields that do not have heavy biocide applications. Land management that integrates agricultural production and conservation helps provide these conditions.

Hazards

Haz1: Loss of natural grasslands to agriculture and other types of development has resulted in substantial loss of habitat for western burrowing owls. Conservation easements on agricultural land can mitigate these losses to some extent.

Haz2: In the absence of burning, mowing, or grazing, grass growth makes habitat unsuitable for the western burrowing owls, so vegetation management, such as properly managed livestock grazing, is necessary.

Haz3: Natural predators of western burrowing owls include larger raptors, foxes, and coyotes; additional predation pressure comes from feral and domestic dogs and cats. A healthy ground squirrel population provides refuges and lessens predation pressure on the owls. Predation

pressure also is reduced by an abundance of alternative prey items, largely determined by weather patterns and the extent of rodent control. Land management that integrates agricultural production and conservation helps provide these conditions as does controlling feral cats and dogs and confining pets to yards or houses.

Haz4: Western burrowing owls can accumulate and be poisoned by various biocides. This usually occurs when these toxins are applied in excess. Integrated management for conservation and agricultural production should minimize these circumstances.

Haz5: Protecting western burrowing owls and their habitat from human disturbance such as OHV use and lessening direct mortality from casual shooting and road kills is important. The breeding period is an especially sensitive time because human disturbance can increase nest predation and nest abandonment and result in prolonged exposure of eggs to the elements, nestling starvation, early fledging, and predation upon fledglings.

These problems occur most frequently in the proximity of residential areas and in the absence of properly controlled recreational use of land. Conservation easements on agricultural land may be effective in minimizing these kinds of disturbances to the owls.

Reproduction

Rep1: Western burrowing owls are semi-colonial, and several pairs nest in close proximity. The nesting success of individual pairs depends upon prey abundance, which in turn depends on weather patterns and habitat condition. Excessive biocide application limits prey availability, and tall, rank vegetation inhibits the ability of the owls to hunt successfully. The presence of California ground squirrels or other medium-sized rodents determines the number of nest sites available to a colony. Again, appropriate conditions for the owls depend on the integration of production agriculture and conservation.

Dispersal and Migration

Dis1: A potential resident western burrowing owl population in Placer County is supplemented by additional individuals during winter. Resident populations remain in their breeding localities year around: the adults are highly philopatric, and young owls usually remain to breed close to their natal sites as long as adequate prey resources are available and habitat remains suitable. Weather conditions and integrated management both play major roles in maintaining resident owl populations. Management techniques that encourage stable prey availability may encourage the establishment of resident populations, and increased adult survival during winter will increase recruitment and population sizes.

Dis2: Migrant populations are those that have bred elsewhere but moved to areas of stable food supply in winter. Migration is a hazardous time, and the birds' physical state and energy reserves and the conditions along their migratory routes and in their breeding habitats are beyond the control of Placer County. However, maintaining the conditions that encourage resident populations also will be beneficial for migrant populations,

Summary

As predators near the top of their food web, western burrowing owls are highly sensitive to ecosystem conditions. They are also quite sensitive to various kinds of disturbance caused by human activities and feral and domestic animals, particularly during the breeding season. These factors suggest that the best strategy for western burrowing owl conservation in Placer County is to conserve range and crop land and manage it in an integrated fashion for both production and biodiversity conservation. The owls' requirements are such that they are very compatible with vernal pool-grassland ecosystem conservation as well.

Western Burrowing Owl, *Athene cunicularia hypugea*

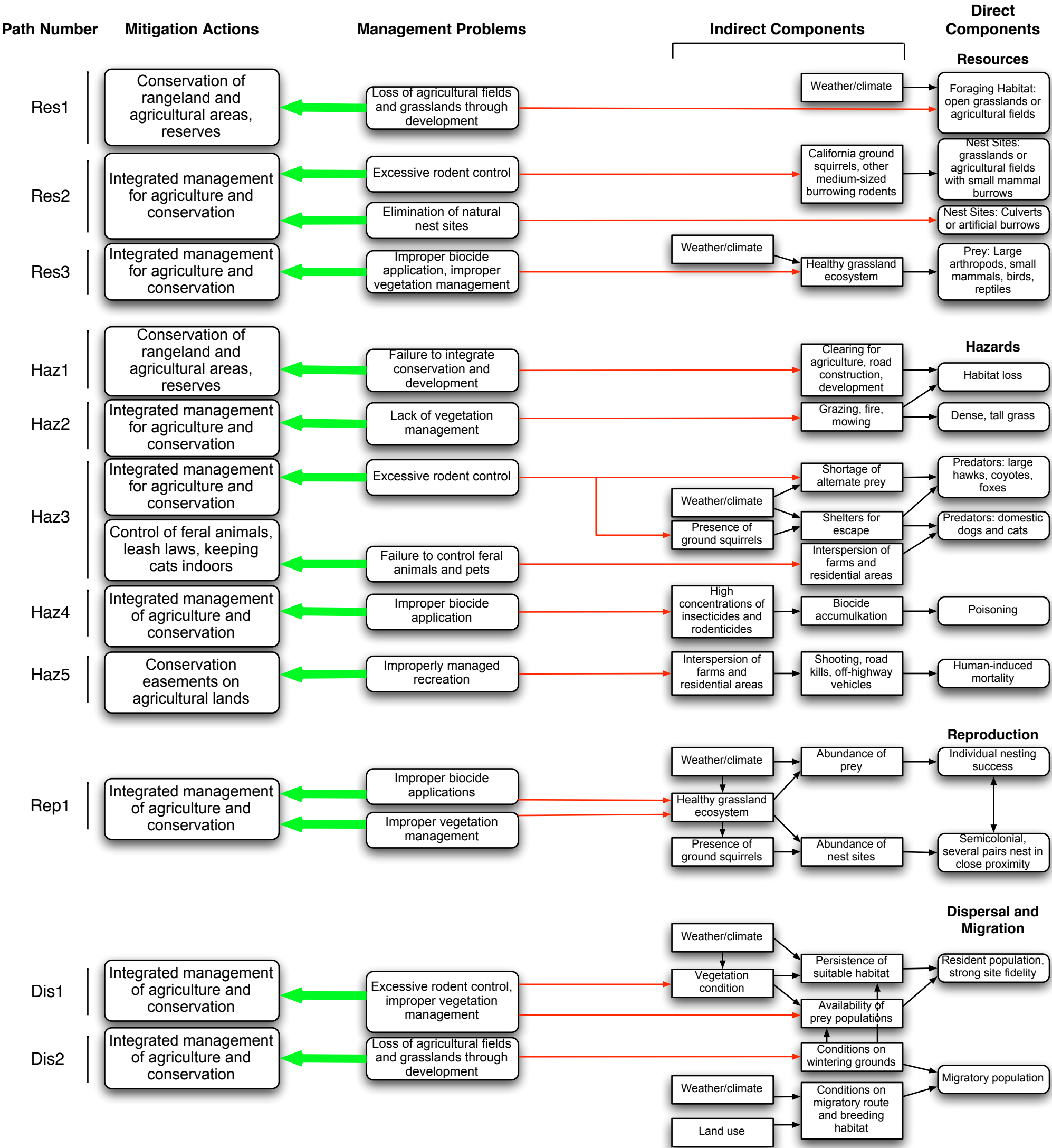


Figure 1. Envirogram. Key to abbreviations: Res = Resources; Haz = Hazards; Rep = Reproduction; Dis = Dispersal.

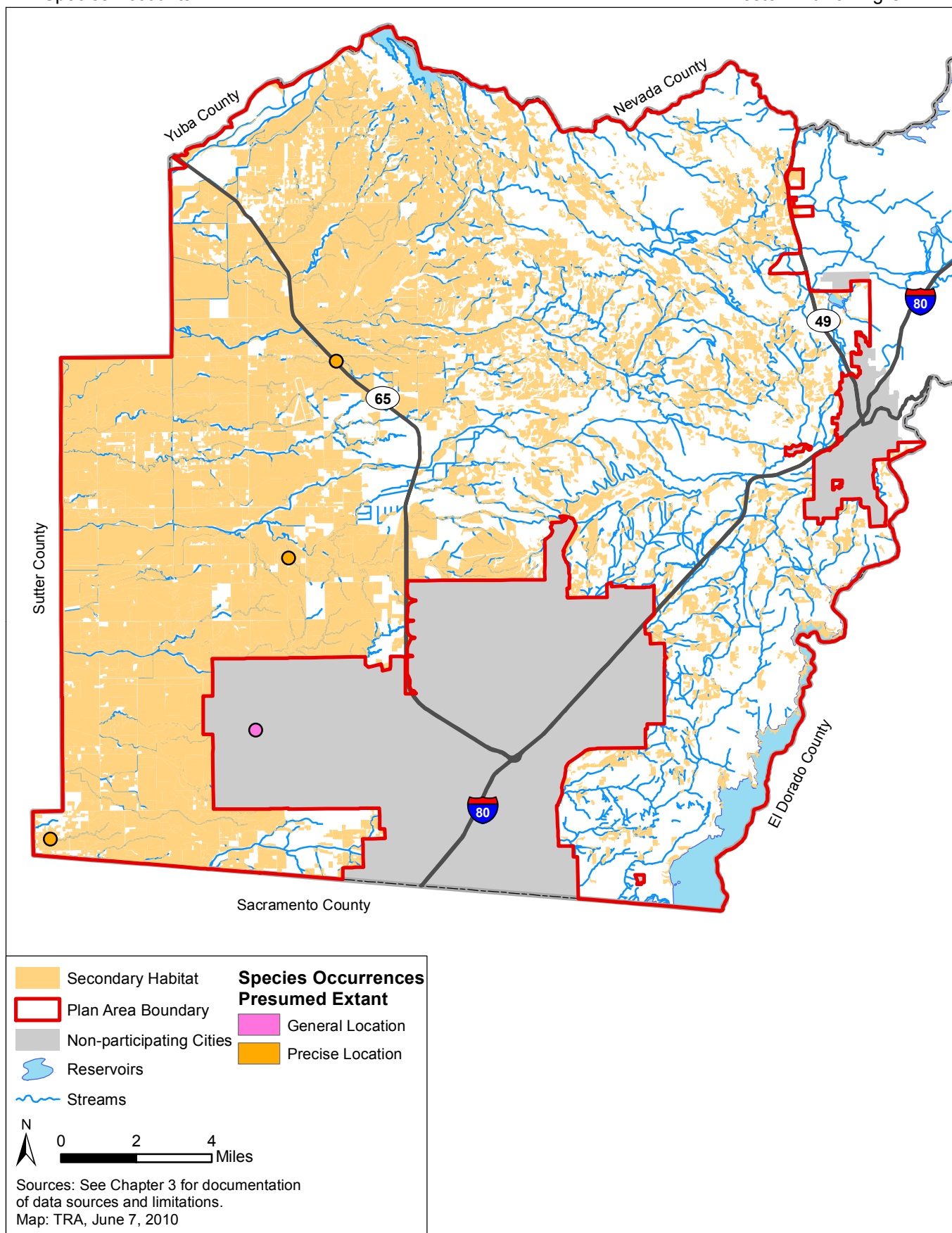


Figure 2. Western burrowing owl modeled habitat distribution. The habitat map presents outcomes of the draft model described above. The purpose of the model is to identify areas within the Plan area where the species occurs or could occur based on known habitat requirements. Those data on which this map is based are regional in scale. This map should not be used for site planning and should be verified in the field.

Occurrence data are limited by where field surveys have been conducted; some occurrence points may be geographically inaccurate. Occurrence records are from the California Natural Diversity Database, 2010.